Embedded Web Browser Based Device Monitoring And Control Using Arm11

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ABSTRACT:

Availability of personal computer and internet everywhere is very useful for monitoring and controlling remote devices and their parameters. A web base control and monitoring system can make us control a system without distance limit and cost effective, programmable and high efficiency controller webpage is necessary for the world competition. The purpose of this paper is to build a remote control system through a webpage. And this system is controlled through local area network by using an embedded TCP/IP protocol suit which is inbuilt in Linux kernel.

This project realizes an embedded web server, which enables data acquisition, control system, status monitoring with the help of any standard web browser. A web server in the device provides access to the user interface functions for the device through a device webpage. A web server can be embedded into any appliance and connected to the Internet so the appliance can be monitored and controlled from remote places through the browser in a desktop. The aim of the project is to control the devices or equipments from the remote place through a web page.

The web-server circuit is connected to LAN or Internet. The client or a person on the PC is also connected to same LAN or Internet. By typing the IP-address of LAN on the web browser, the user gets a web page on screen; this page contains all the information about the status of the devices or sensors interfaced. The user can also control the devices interfaced to the web server by pressing a button provided in the web page. The system is implemented using ARM11 running at 700MHz.

Keywords:

ARM11 processor, Sensors, Relay, Embedded Linux.

I.INTRODUCTION :

In this modern era of automation and advanced computing the social and commercial needs of mankind are changing very frequently. To keep up with these changes, we need to develop systems which are capable of performing different functions within some specified limits of time, accuracy and cost. Automation can be very effective to reduce human effort and involvement in different areas. This can be a boon for those industries which need a lot of skilled employees and also in areas where it is dangerous for lives of people involved in that job.

In most of the modern industries, there is a need of data monitoring and control, for this application embedded web server can prove to be a very good system which may be capable of reducing the need of skilled workers. An embedded system is a device that has computer intelligence and is dedicated to performing a single task, or a group of related tasks. Embedded systems often perform monitoring and control functions such as gathering and reporting sensor readings or controlling motors and switches.

A web server is a system which hosts websites and provides services for any requesting clients. The general purpose web server composes of an operating system, web pages or web applications and a huge amount of memory and sometimes a special hardware. The embedded web server is the combination of embedded device and Internet technology, which provides a flexible remote device monitoring and management function based on Internet browser and it has become an advanced development trend of embedded technology.

II.HARDWARE DESCRIPTION:

To implement this embedded web server we used different hardware, which are described in this section.

1. ARM processor:

The ARM processor is an based single board computer running the GNU/LINUX operating system. It is powered by BCM2835 System on chip from Broadcom that contains an ARM processor running at 700MHz.

It has many peripherals such as USB master port, 10/100 Ethernet, HDMI and composite video outputs, and SD card slot. It has 256 MB of RAM and a few general input/output pins (GPIO) are available for low level interfacing with external electronic circuitry. The Raspberry Pi has the microprocessor ARM1176JZF-S which is a member of ARM11 family and has ARM v6 architecture.

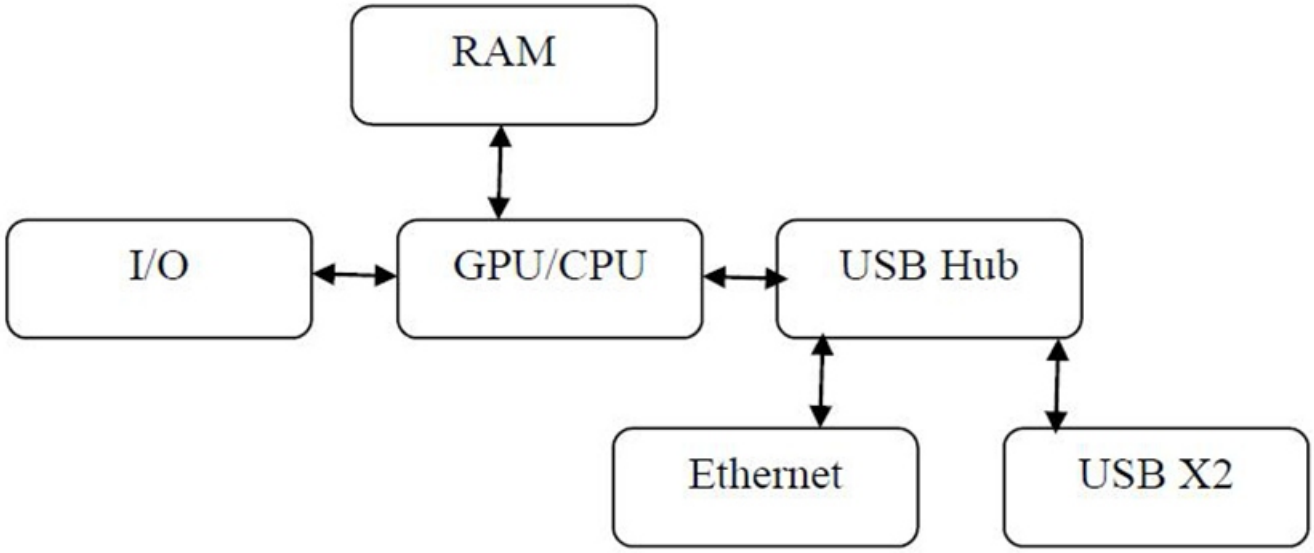


Figure-2: block diagram of ARM processor

2. Ethernet:

Ethernet is the networking technology used in many offices and homes to enable computers to communicate and share resources. Many Ethernet networks also connect to a router that provides access to the Internet. IEEE 802.3 supports a LAN standard originally developed by Xerox and later extended by a joint venture between Digital Equipment Corporation, Intel Corporation and Xerox. This was called Ethernet.

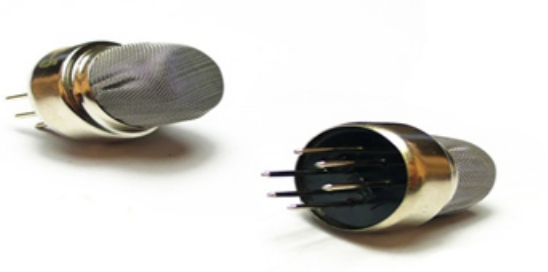
3. Sensors:

Temperature sensor (lm35): The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional Celsius (Centigrade) temperature. The LM35 thus has an advantage over linear temperature sensors calibrated in ° Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Centigrade scaling. The LM35 does not require any external calibration or trimming to provide typical accuracies of ±¼°C at room temperature and ±¾°C over a full -55 to +150°C temperature range. Low cost is assured by trimming and calibration at the wafer level. The LM35's low output impedance, linear output, and precise inherent calibration make interfacing to readout or control circuitry especially easy. It can be used with single power supplies, or with plus and minus supplies.

As it draws only 60 µA from its supply, it has very low self-heating, less than 0.1°C in still air. The LM35 is rated to operate over a -55° to +150°C temperature range, while the LM35C is rated for a -40° to +110°C range (-10° with improved accuracy). The LM35 series is available packaged in hermetic TO-46 transistor packages, while the LM35C, LM35CA, and LM35D are also available in the plastic TO-92 transistor package. The LM35D is also available in an 8-lead surface mount small outline package and a plastic TO-220 package.

GAS sensor (MQ5):

High sensitivity to LPG, natural gas, town gas Small sensitivity to alcohol, smoke.Fast response Stable and long life Simple drive circuit.



III.SOFTWARE DESCRIPTION:

Various software resources were used to implement the project, these are described below:

1. Raspbian OS : Raspbian is an unofficial port of Debian Wheezy armhf with compilation settings adjusted to produce code that uses "hardware floating point", the "hard float" ABI and will run on the Raspberry Pi. The port is necessary because the official Debian Wheezy armhf release is compatible only with versions of the ARM architecture later than the one used on the Raspberry Pi (ARMv7-A CPUs and higher vs the Raspberry Pi's ARMv6 CPU).

2. PSoC Creator: PSoC Creator is the secondgeneration software IDE to design debug and program the Cypress PSoC3 and Cypress PSoC3 5 devices. The development IDE is combined with an easy to use graphical design editor to form a powerful hardware/software codesign environment. PSoC Creator consists of two basic building blocks. The program that allows the user to select, configure and connect existing circuits on the chip and the components which are the equivalent of peripherals on MCUs. What makes Cypress PSoC3 intriguing is the possibility to create own application specific peripherals in hardware.

3. Apache 2.2: Apache, otherwise known as "Apache HTTP Server", is an established standard in the online distribution of website services, which gave the initial boost for the expansion of the World Wide Web. It is an open-source web server platform, which guarantees the online availability of the majority of the websites active today. The server is aimed at serving a great deal of widely popular modern web platforms/ operating systems such as Unix, Windows, Linux, Solaris, Novell NetWare, FreeBSD, Mac OS X, Microsoft Windows, OS/2, etc. Apache 2.2 came out in 2006 and offers new and more flexible modules for user authentication and proxy caching, support for files exceeding 2 GB, as well as SQL support. Apache 2.2 version was used for creating Web server for this project.

4. PHP: The PHP Hypertext Pre-processor (PHP) is a programming language that allows web developers to create dynamic content that interacts with databases. PHP is basically used for developing web based software applications. PHP is a recursive acronym for "PHP: Hypertext Preprocessor". PHP is a server side scripting language that is embedded in HTML. It is used to manage dynamic content, databases, session tracking, even build entire e-commerce sites. PHP Syntax is C-Like.

5.MySQL: It is the most popular Open Source Relational SQL database management system. MySQL is a small, compact database server ideal for small and not so small applications. In addition to supporting standard SQL (ANSI), it compiles on a number of platforms5and has multithreading abilities on Unix servers, which make for great performance.

For non Unix people, MySQL can be run as a service on Windows NT and as a normal process in Windows 95/98 machines.

IV.TESTING AND RESULTS:

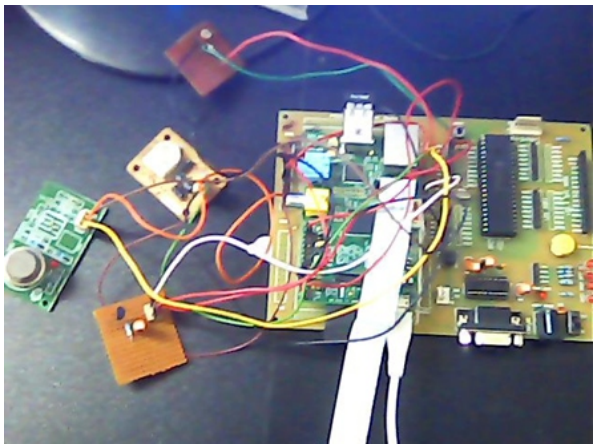


Figure-3: obtaining of results

V. CONCLUSION:

In this project our task is to acquire data from sensor and make it accessible over a network on which it could be accessed by any remote client. After completion of project we are able to receive data from a remote client using ARM embedded web server which we had implemented using Raspberry pi, This acquired data from the sensors was successfully displayed on the webpage when requested from any other system connected to the server.

VI. REFERENCES:

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